CS 213
Introduction to Computer Systems

Course Organization

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Topics:
- Staff, text, and policies
- Lecture topics and assignments
- Lab rationale

Teaching staff

Instructors
- Prof. Guy Blelloch (Tue 3:30-4:30, DH 4307)
- Prof. Todd C. Mowry (Fri 10:00-11:00, WeH 8123)

TA's
- Angela Brown (Tue 2:30-3:30, WeH 3711)
- Patrick Chiu (Fri 2:30-3:30, WeH 3108)
- Jun Gao (Wed 4:00-5:00, WeH 7110)
- Ted Wong (Thu 1:00-2:00, WeH 8101)
- Antonia Zhai (Wed 3:00-4:00, WeH 8301)

Course Admin
- Maury Burgwin (WeH 8124)

  These are the nominal office hours. Come talk to us anytime!
  (Or send email)

Textbook

Samuel P. Harbison and Guy L. Steele,
- *C: A Reference Manual*,
- *Fourth Edition*
- Prentice Hall, 1994

Unfortunately, there is no real "textbook" for this material.
- H&S is a C reference book, since we will be programming in C.
  - Note: simply knowing C++ is not sufficient, since C is different.
- It provides only partial coverage of the course material.

Remainder will be provided in notes and handouts.

(Bryant & O'Hallaron are working on an alpha version of a text.)

Course Components

Lectures
- higher level concepts

Recitations
- applied concepts, important tools and skills for labs, clarification of lectures, exam coverage

Labs
- multi-week (usually 2 weeks)
- groups of up to 2 people
- provide in-depth understanding of an aspect of systems
- programming and measurement

Homeworks
- 1 week (individual)
- solving a series of smaller problems, some programming
- drills to provide practice for exams

Getting Help

Web
- www.cs.cmu.edu/afs/cs/academic/class/15213-s00/www
- Copies of lectures, assignments, exams, solutions
- Clarifications to assignments
- Summaries of performance on exams and assignments

Newsgroup
- cmu.cs.class.cs213
- Clarifications to assignments, general discussion

Personal help
- Professors: door open means come on in (no appt necessary)
- TAs: please mail or zephyr first.

Policies: Assignments

Work groups
- You may do all labs and homeworks in groups of up to 2 .

Handins
- Basically something due every Thursday
- Assignments due at 12:01am on specified due date.
  - I.e. the start of the day, not the end of the day
- Electronic handins only.

Makeup exams and assignments
- OK, but must make PRIOR arrangements with either Prof. Blelloch or Prof. Mowry.

Appealing grades
- Within 7 days of due date.
- Assignments: Talk to lead TA first, then one of the professors.
- Exams: Talk to either Prof. Blelloch or Prof. Mowry.

Policies: Grading

Exams (50%)
- Two in class exams (12.5% each)
- Final (25%)
- All exams are open book/open notes.

Assignments (50%)
- 5 homeworks (~1 week, 2% each)
- 5 labs (~2 weeks, 8-12% each)

Grading Characteristics
- Assignment scores tend to be high
  - Serious handicap if you don't hand a lab in
- Tests have big bearing on letter grade
  - Wider range of scores
  - Only chance for us to evaluate individual performance

Facilities

Assignments will use Intel Computer Systems Cluster
- 25 Pentium III machines donated by Intel specifically for CS 213
- 550 MHz with 256 MB memory.
- Rack mounted in the 3rd floor Wean machine room.

Part 1: Programs (12)

Topics
- Bits operations, arithmetic, assembly language programs, representation of C control and data structures, object files, processes, asynchronous processing, system programming
- Includes aspects of of architecture, OS, and compilers

Assignments
- L1: Integer arithmetic
- H1: Human decompiler
- L2: Defusing a binary bomb

- H2: floating point
- H3: system programming

Part 2: Memory (8)

Topics
- Memory management, memory technology, memory hierarchy, address translation
- Includes aspects of architecture and OS.

Assignments
- L3: Dynamic memory allocation

- H4: Address translation

Part 3: Performance (2)

Topics
- Code optimization (control and data), performance evaluation, benchmarking
- Includes aspects of architecture and compilers

Assignments
- L4: Optimizing cache performance

Part 4: Networking (5)

Topics
- Network technology, protocol stacks, TCP/IP, routing, sockets, internetworking, and Web programming
- Includes aspects of networking and architecture

Assignments
- L5: building a chat server
- H5: network simulation

Lab Rationale

Each lab should have a well-defined goal such as solving a puzzle or winning a contest.
- Defusing a binary bomb.
- Winning a performance contest.

Doing a lab should result in new skills and concepts
- Bit Manipulation: computer arithmetic, digital logic.
- Bomb: assembly language, using a debugger.
- Malloc: understanding pointers and nasty memory bugs.
- Cache: profiling, measurement, performance debugging.
- Chat: network programming & performance, client/server computing.